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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/401,132	09/22/1999	HUNG-JU LEE	SAR-12598A	4242

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EXAMINER	
WONG, ALLEN C	

ART UNIT	PAPER NUMBER
2621	

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06/15/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/401,132	LEE ET AL.	
	Examiner	Art Unit	
	Allen Wong	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *22-26,28-30,32-36,38-49 and 51-64* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *22-26,28-30,32-36,38-49 and 51-64* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/23/07 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 22, 29 and 32 have been considered but are moot in view of the new ground(s) of rejection.

Double Patenting

Claims 22-24, 27-30, 32-34 and 38 are rejected under judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-13 of U.S. Patent No. 6,023,296. Although the conflicting claims are not identical, they are not patentably distinct from each other because they are broader in scope. Allowance of these claims would give the applicant an undue timewise extension of monopoly.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The USPTO "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility" (Official Gazette notice of 22 November 2005), Annex IV, reads as follows:

> Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data.
>
> When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and Warmerdam, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim) with Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).
>
> In contrast, a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-84, 32 USPQ2d at 1035.

Claims 32-36, 38, 56-59 and 63-64 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter as follows. Claim 32 defines a **"computer readable medium having stored thereon a plurality of instructions which..."** embodying functional descriptive material. However, the claim does not define a computer-readable medium or memory and is thus non-statutory for that reason (i.e., "When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized" – Guidelines Annex IV). That is, the scope of the presently claimed **"computer readable medium having stored thereon a plurality of instructions which..."** can range from paper on which the program is written, to a program simply contemplated and memorized by a person. The examiner suggests

amending claim 32 to "*a computer readable medium encoded with computer executable instructions for...comprising:*", to make the claim statutory. Any amendment to the claim should be commensurate with its corresponding disclosure.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 22-26, 28-30, 32-36, 38-49 and 51-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eleftheriadis (6,055,330) and Klein Gunnewiek (5,606,371) in view of Stone (5,223,926).

Regarding claims 22, 32, 43, 51 and 52, Eleftheriadis discloses a method for allocating bits to encode each frame of an image sequence, each frame of said image sequence having at least one object, and a computer readable medium having stored thereon a plurality of instructions, the plurality of instructions including instructions which, when executed by a processor (col.15, ln.19-35), cause the processor to perform the steps comprising of:

determining a target frame bit rate for the frame in accordance with a quantizer scale (col.11, ln.53 to col.12, ln.32; Eleftheriadis discloses the frame bit rate R, and R_i is the target average bit rate for each object, and a_i is the amount of total frame rate R, which is allocated to the object, while R_n is the amount of the total frame rate R, which is

allocated to the background, and that the quantizer scale or parameter is adjusted for affecting the target frame bit rate, where in fig.16, element 1651 is a quantizer);

allocating said target frame bit rate among the plurality of one object in accordance with a target object bit rate for the at least one object (col.11, ln.65 to col.12, ln.19; note equation 4 is used to determine the target frame bit rate, where part of the target frame bit rate is allocated as the target object bit rate, while the remainder is allocated as background target bit rate, the sum of the two being equal to the target frame bit rate R);

generating the quantizer scale for each of said plurality of objects in accordance with said target object bit rate, wherein quantizer scale provides coarser and/or fewer allowed quantization values (col.11, ln.39-52; Eleftheriadis discloses the use of variety of quantization values for each object, in that the quantization can vary from a finer quantizer parameter to a coarser quantizer parameter); and

recursively adjusting the target frame bit rate for each frame in the sequence (col.8, ln.17-39; note the recursive buffer rate control scheme is utilized to ensure that the buffer does not overflow or underflow and the quantization parameter can be recursively adjusted for changing the frame bit rate for each frame, including I, P and B frames).

Eleftheriadis does not specifically disclose the equation $V_i = K_i \times T_{frame}$. However, Klein Gunnewiek teaches that the derivation of the target frame rates of I, P and B frames can be ascertained mathematically from the equations for different targeted frames and pictures (see equations 4 and 5 and note T_p and T_B and T_I are the target

frame bit rates, and note that K_p and K_B are constant values that are applied in a similar manner to applicant's K_i in the applicant equation $V_i = K_i \times T_{frame}$ where T_{frame} can be derived to be equal to $T_{frame} = V_i / K_i$). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Eleftheriadis and Gunnewiek as a whole to arrive at the conclusion of an object bit rate equation as denoted by applicant's $V_i = K_i \times T_{frame}$ by mathematical deduction and equation manipulation over time for accurately, efficiently encoding image data and mantaining high quality images at the display terminal (Gunnewiek col.2, ln.37-38).

Eleftheriadis and Gunnewiek does not specifically disclose wherein said quantizer scale provides coarser and/or fewer allowed quantization values for a high frequency subband of said image sequence than for a low frequency subband of said image sequence. However, Stone teaches wherein the quantizer scale provides coarser and/or fewer allowed quantization values for a high frequency subband of the image sequence than for a low frequency subband of the image sequence (col.14, ln.27-47; Stone discloses the use of a quantization matrix that contains a plurality of quantization values for providing coarser or finer quantization parameters depending on the image data). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Eleftheriadis, Gunnewiek and Stone, as a whole, for accurately encoding video image data in a flexible manner while reducing hardware requirements so as to permit improved encoding efficiency (Stone col.3, ln.57-59 and col.7, ln.16-18).

Regarding claims 23, 30, 33, 44-46, 53, 54, 58 and 59, Eleftheriadis discloses the use of the sum of the absolute differences, between two VOPs to obtain shape information, and further control the rate at which object information is processed (the mean absolute difference must be manipulated from the summing of the absolute differences).

Regarding claims 24, 34 and 40, Eleftheriadis discloses the buffer fullness (col.11, ln.53-64, buffer fullness is checked and monitored for buffer overflow or underflow).

Regarding claims 25, 35 and 47, Eleftheriadis discloses the use of shape information for both field or frame compression, and object-based compression (col.3, ln.26-30, syntax information, motion information, and shape information must be disclosed in object based compression).

Regarding claims 26 and 36, Eleftheriadis discloses other rate control techniques which assigns different bit rates to objects based on shape or depth information (col.19, ln.23-35).

Regarding claims 28 and 38, Eleftheriadis discloses the quantization for encoding object information (col.15, ln.19-35).

Regarding claims 29 and 55-57, Eleftheriadis discloses an apparatus for encoding each frame of an image sequence, said frame comprising a plurality of objects, said apparatus comprising:

a motion compensator for generating a predicted image of a current frame (fig.16, element 1640);

a transform module for applying a transformation to a difference signal between the current frame and said predicted image, where said transformation produces a plurality of coefficients (fig.16, element 1650);

a quantizer for quantizing said plurality of coefficients with at least one quantizer scale for each object in the frame (fig.16, element 1651 is a quantizer; col.11, ln.53 to col.12, ln.32, Eleftheriadis discloses the frame bit rate R, and R_i is the target average bit rate for each object, and a_i is the amount of total frame rate R, which is allocated to the object, while R_n is the amount of the total frame rate R, which is allocated to the background); and

a controller for selectively adjusting said at least one quantizer scale for a current frame in response to a target object bit rate for the at least one object, wherein said target object bit rate is derived from a target frame bit rate (fig.16, note "rate control" is done a rate controller to control the buffer overflow and underflow conditions for controlling the buffer occupancy).

Eleftheriadis does not specifically disclose the equation $V_i = K_i \times T_{frame}$. However, Klein Gunnewiek teaches that the derivation of the target frame rates of I, P and B frames can be ascertained mathematically from the equations for different targeted frames and pictures (see equations 4 and 5 and note T_p and T_B and T_I are the target frame bit rates, and note that K_p and K_B are constant values that are applied in a similar manner to applicant's K_i in the applicant equation $V_i = K_i \times T_{frame}$ where T_{frame} can be derived to be equal to $T_{frame} = V_i / K_i$). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Eleftheriadis and Gunnewiek as a

whole to arrive at the conclusion of an object bit rate equation as denoted by applicant's $V_i = K_i \times T_{frame}$ by mathematical deduction and equation manipulation over time for accurately, efficiently encoding image data and mantaining high quality images at the display terminal (Gunnewiek col.2, ln.37-38).

Eleftheriadis and Gunnewiek does not specifically disclose wherein said quantizer scale provides coarser and/or fewer allowed quantization values for a high frequency subband of said image sequence than for a low frequency subband of said image sequence. However, Stone teaches wherein the quantizer scale provides coarser and/or fewer allowed quantization values for a high frequency subband of the image sequence than for a low frequency subband of the image sequence (col.14, ln.27-47; Stone discloses the use of a quantization matrix that contains a plurality of quantization values for providing coarser or finer quantization parameters depending on the image data). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Eleftheriadis, Gunnewiek and Stone, as a whole, for accurately encoding video image data in a flexible manner while reducing hardware requirements so as to permit improved encoding efficiency (Stone col.3, ln.57-59 and col.7, ln.16-18).

Regarding claim 39, Eleftheriadis discloses the target frame bit rate is determined from a remaining number of bits for the image sequence, a number of remaining frames in the image sequence, and/or a number of bits encoding a previous frame (col.11, ln.65 to col.12, ln.19; note equation 4 is used to determine the target frame bit rate, where part of the target frame bit rate is allocated as the target object bit

rate, while the remainder is allocated as background target bit rate, the sum of the two being equal to the target frame bit rate R).

Regarding claim 41, Eleftheriadis discloses the polynomial regression is used for recursively adjusting the target frame bit rate (col.11, ln.63 to col.12, ln.10, note the equation is used in a recursive manner and when the equation is expanded, it is expressed as a polynomial regression).

Regarding claim 42, Eleftheriadis discloses the estimation of complexity, deriving the predicted number of bits to code the frame from the estimated complexity and calculating the quantizer scale in accordance with complexity (fig.16, note the activity or complexity is estimated in motion estimation 1640, and that there the predicted values estimated based on the input information versus the predicted information to establish a proper coding bit rate, and then, the quantizer 1651 is then applied for properly adjusting the quantizer value in accordance with the complexity, based on the recursive coding process illustrated in fig.16).

Regarding claims 48 and 49, Eleftheriadis discloses the changing of bit numbers for shape coding (fig.16, note the number of bits can incrementally or decrementally adjusted for shape coding; and in col.3, ln.26-30, syntax information, motion information, and shape information must be disclosed in object based compression).

Claims 60-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eleftheriadis (6,055,330), Klein Gunnewiek (5,606,371) and Stone (5,223,926) in view of Balakrishnan (5,566,208).

Eleftheriadis, Klein Gunnewiek and Stone do not specifically disclose skipping the next frame without encoding the next frame when the buffer fullness plus an estimated target frame bit rate of the next frame is above 80% of the size of the buffer. However, Balakrishnan teaches skipping frames is done when the buffer threshold is exceeded (col.12, ln.55 to col.13, ln.3). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Eleftheriadis, Klein Gunnewiek, Stone and Balakrishnan, as a whole, for efficiently encoding image data in an accurate, high quality manner and regulating buffer level requirements so as to conveniently ensure encoding efficiency and flexibility (Balakrishnan col.4, ln.13-14).

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen Wong whose telephone number is (571) 272-7341. The examiner can normally be reached on Mondays to Thursdays from 8am-6pm Flextime.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John W. Miller can be reached on (571) 272-7353. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Allen Wong
Primary Examiner
Art Unit 2621

AW
6/11/07